Caged Fish Studies to Detect and Monitor Contaminants of Emerging Concern in the Great Lakes

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Effects-based monitoring studies were conducted in the St. Louis Harbor, Lake Superior, in support of the Great Lakes Restoration Initiative (GLRI). The overall goal of the research was to develop and validate methods using caged fish exposures to detect and monitor contaminants of emerging concern (CECs) around the Great Lakes. In 2010, four field sites including the upper St. Louis River (Fond du Lac), two locations near the Western Lake Superior Sanitary District (WLSSD), and one location near the Superior Municipal Treatment Plant (SMTP) were investigated. Caged fish exposure systems and integrated water sampling devices were developed, and sexually mature fathead minnows *(Pimephales promelas)* were deployed at each location for 2 to 10 days. A number of endpoints were examined in the fish, including plasma vitellogenin and steroid concentrations, expression of different genes that could be impacted by specific CECs, and NMR-based hepatic metabolite profiles. In addition, an extensive suite of CECs were measured in water from the sites where fish had been deployed. Survival and recovery of the fish from the in situ exposure system was excellent, and initial results suggest the presence of estrogenic and/or steroidogenesis-altering chemicals or conditions at sites proximal to waste water treatment plant discharges. Preliminary chemical analyses indicate substantial difference among the sites with regard to CEC profiles. This presentation will provide an overview and synthesis of the biological and analytical work done to date, as well as recommendations for conducting future studies of this type at other Great Lakes sites.

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